

CLAIMS

What is claimed is:

1. A method of optimizing recording conditions of an optical recording medium, comprising:
recording a test write pattern in a plurality of tracks of the optical recording medium; and
checking a quality of a radio frequency signal reproduced from one of the plurality of tracks in which the write pattern is recorded and which is effected by writing in adjacent tracks to determine the optimized recording conditions.
2. The method of claim 1, wherein the test write pattern comprises a combination of marks of two or more different lengths and a space.
3. The method of claim 1, wherein the test write pattern comprises a first mark of length T , and a second mark of length NT which is longer than the first mark and in which power is saturated due to the formation of the marks, and a space, and wherein T is a cycle of a recording and/or reproducing clock and N is an integer.
4. The method of claim 2, wherein, when the optical recording medium uses a run-length-limited (RLL) (1, 7) code, the test write pattern comprises a combination of marks of two or more different lengths and a space.
5. The method of claim 2, wherein, when the optical recording medium uses an RLL (1, 7) code, the test write pattern comprises a mark of length $2T$ and a mark of length $5T$, and a space.
6. The method of claim 2, wherein, when the optical recording medium uses a run-length-limited (RLL) (2, 6) code, the test write pattern comprises a combination of marks of two or more different lengths and a space.
7. The method of claim 2, wherein, when the optical recording medium uses a run-length-limited (RLL) (2, 10) code, the test write pattern comprises a mark of length $3T$ and a mark of length $6T$, and a space.

8. The method of claim 1, wherein the checking further comprises optimizing power conditions for the test write pattern using a magnitude of the radio frequency signal.

9. The method of claim 1, wherein the checking further comprises optimizing a condition of the write pattern using the magnitude of the radio frequency signal.

10. The method of claim 1, wherein the checking further comprises optimizing a condition of the write pattern using an asymmetry value of the radio frequency signal.

11. The method of claim 1, wherein the checking further comprises optimizing a condition of the write pattern using a jitter value of the radio frequency signal.

12. A method of determining optimum powers necessary for recording by performing test recording on an optical recording medium, comprising:

recording a test write pattern in a plurality of tracks of the optical recording medium; and
determining the optimum powers using a magnitude of a radio frequency signal reproduced from one of the plurality of tracks effected by writing in adjacent tracks.

13. The method of claim 12, wherein the test write pattern comprises a combination of marks of two or more different lengths and a space.

14. The method of claim 12, wherein the test write pattern comprises a first mark of length T , and a second mark of length NT which is longer than the first mark and in which power is saturated due to the formation of the marks, and a space, and wherein T is a cycle of a recording and/or reproducing clock and N is an integer.

15. The method of claim 13, wherein, when the optical recording medium uses a run-length-limited (RLL) (1, 7) code, the test write pattern comprises a combination of marks of two or more different lengths and a space.

16. The method of claim 13, wherein, when the optical recording medium uses an RLL (1, 7) code, the test write pattern comprises a mark of length $2T$ and a mark of length $5T$, and a space.

17. The method of claim 13, wherein, when the optical recording medium uses a run-length-limited (RLL) (2, 6) code, the test write pattern comprises a combination of marks of two or more different lengths and a space.

18. The method of claim 13, wherein, when the optical recording medium uses a run-length-limited (RLL) (2, 10) code, the test write pattern comprises a mark of length $3T$ and a mark of length $6T$, and a space.

19. The method of claim 12, wherein the magnitude of the radio frequency signal is determined to be a peak-to-peak value of a radio frequency signal for a mark of length T of the test write pattern in which a power is saturated due to the formation of marks.

20. The method of claim 12, wherein the determining comprises:
reproducing the test write pattern recorded in a middle track of the plurality of tracks effected by writing on adjacent tracks to output a radio frequency signal; and
fixing two of write, bias, and erase powers and varying the other one of the write, bias, and erase powers within a range to determine optimum write, bias, and erase powers when the magnitude of the radio frequency signal is at a maximum.

21. The method of claim 12, wherein the recording comprises:
setting standard write, erase, and bias powers for recording the test write pattern; and
recording the test write pattern in the plurality of tracks.

22. The method of claim 21, wherein the determining comprises:
reproducing, by a radio frequency signal, the write pattern recorded in a middle track of the plurality of tracks effected by writing on adjacent tracks;
detecting an envelope of the radio frequency signal to detect a maximum amplitude of the radio frequency signal;
fixing the write and bias powers and varying the erase power within a range to determine whether the magnitude of the radio frequency signal is the maximum amplitude value,

wherein, when the magnitude of the radio frequency is not the maximum amplitude, repeating the reproducing, detecting, and fixing, and wherein, when the magnitude of the radio frequency is the maximum amplitude value, determining the erase power is an optimum erase power.

23. The method of claim 22, wherein the determining further comprises:

fixing the bias power and the optimum erase power and varying the write power within a range to determine whether the magnitude of the radio frequency signal is the maximum amplitude value,

wherein, when the magnitude of the radio frequency signal is not the maximum amplitude, repeating the reproducing, detecting, and fixing, and wherein, when the magnitude of the radio frequency signal is the maximum amplitude value, determining the write power is an optimum write power.

24. The method of claim 23, wherein the determining further comprises:

fixing the optimum erase power and the optimum write power and varying the bias power within a range to determine whether the magnitude of the radio frequency signal is the maximum amplitude value,

wherein, when the magnitude of the radio frequency signal is not the maximum amplitude, repeating the reproducing, detecting, and fixing, and wherein, when the magnitude of the radio frequency signal is the maximum amplitude value, determining the bias power is an optimum bias power.

25. The method of claim 12, further comprising:

setting the optimum powers determined in the determining and recording the test write pattern;

reproducing the test write pattern recorded on the optical recording medium to output the radio frequency signal; and

determining the test write pattern using the magnitude of the radio frequency signal.

26. The method of claim 25, wherein in the test write pattern determining, when the magnitude of the radio frequency signal is a maximum amplitude, a write pattern element indicating a period of time for which a cooling pulse lasts is determined.

27. The method of claim 25, further comprising determining the test write pattern using an asymmetry value of the radio frequency signal.

28. The method of claim 27, wherein in the test write pattern determining, when the asymmetry value of the radio frequency signal is at a minimum, a write pattern element indicating a shift amount of a starting edge of a first pulse is determined.

29. The method of claim 25, further comprising determining the write pattern using a jitter value of the radio frequency signal.

30. The method of claim 29, wherein in the determining the write pattern using a jitter value, when the jitter value of the radio frequency signal is a minimum, a write pattern element indicating a width of the first plus is determined.

31. The method of claim 29, wherein in the test write pattern determining, when the jitter value of the radio frequency signal is a minimum, a write pattern element indicating a width of multi-pluses is determined.

32. A method of determining a write pattern by performing test recording on an optical recording medium, comprising:

- recording a test write pattern on the optical recording medium;
- reproducing the test write pattern to output a radio frequency signal; and
- determining a write pattern using a magnitude of the radio frequency signal.

33. The method of claim 32, wherein the test write pattern comprises a combination of marks of two or more different lengths and a space.

34. The method of claim 32, wherein the test write pattern comprises a first mark of length T, and a second mark of length NT which is longer than the first mark and in which power is saturated due to the formation of the marks, and a space, and wherein T is a cycle of a recording and/or reproducing clock and N is an integer.

35. The method of claim 33, wherein, when the optical recording medium uses a run-length-limited (RLL) (1, 7) code, the test write pattern comprises a combination of marks of two or more different lengths and a space.

36. The method of claim 33, wherein, when the optical recording medium uses an RLL (1, 7) code, the test write pattern comprises a mark of length $2T$ and a mark of length $5T$, and a space.

37. The method of claim 33, wherein, when the optical recording medium uses a run-length-limited (RLL) (2, 6) code, the test write pattern comprises a combination of marks of two or more different lengths and a space.

38. The method of claim 33, wherein, when the optical recording medium uses a run-length-limited (RLL) (2, 10) code, the test write pattern comprises a mark of length $3T$ and a mark of length $6T$, and a space.

39. The method of claim 32, wherein in the determining, when the magnitude of the radio frequency signal is a maximum amplitude value, a write pattern element indicating a period of time for which a cooling pulse lasts is determined.

40. The method of claim 32, further comprising determining the write pattern using an asymmetry value of the radio frequency signal.

41. The method of claim 40, wherein in the determining the write pattern using an asymmetry value, when the asymmetry value of the radio frequency signal is a minimum, a write pattern element indicating a shift amount of a starting edge of a first pulse is determined.

42. The method of claim 32, further comprising determining the write pattern using a jitter value of the radio frequency signal.

43. The method of claim 42, wherein in the determining the write pattern using a jitter value, when the jitter value of the radio frequency signal is a minimum, a write pattern element indicating a width of the first pulse is determined.

44. The method of claim 42, wherein in the determining the write pattern using a jitter value, when the jitter value of the radio frequency signal is a minimum, a write pattern element indicating a width of multi-pulses is determined.

45. A method of determining a write pattern by performing test recording on an optical recording medium, comprising:

fixing a first write pattern element indicating a width of a first pulse and a second write pattern element indicating a width of multi-pulses, setting a third write pattern element indicating a shift amount of a starting edge of the first pulse, and setting a fourth write pattern element indicating a period of time for which a cooling pulse lasts to record a test write pattern;

reproducing the test write pattern to output a radio frequency signal;

detecting an asymmetry of the radio frequency signal;

detecting an envelope of the radio frequency signal; and

determining the third write pattern element using the asymmetry of the radio frequency signal and determining the fourth write pattern element using the envelope of the radio frequency signal.

46. The method of claim 45, further comprising:

detecting a jitter of the radio frequency signal;

fixing the third and fourth write pattern elements, re-setting the first and second write pattern elements, and recording the test write pattern; and

determining the first and second write pattern elements using the jitter of the radio frequency signal.

47. An optical recording and/or reproducing apparatus comprising:

a pickup & a radio frequency signal detector that records a test write pattern in one or more tracks and reproduces the test write pattern recorded in one of the tracks effected by writing in adjacent tracks;

a first detector which detects a magnitude of a radio frequency signal; and

a system controller which determines optimum powers using the magnitude of the radio frequency signal.

48. The optical recording and/or reproducing apparatus of claim 47, wherein the test write pattern comprises a combination of marks of two or more different lengths and a space.

49. The optical recording and/or reproducing apparatus of claim 47, wherein the test write pattern comprises a first mark of length T , and a second mark of length NT which is longer than the first mark and in which power is saturated due to the formation of the marks, and a space, and wherein T is a cycle of a recording and/or reproducing clock and N is an integer.

50. The optical recording and/or reproducing apparatus of claim 48, wherein, when the optical recording medium uses a run-length-limited (RLL) (1, 7) code, the test write pattern comprises a combination of marks of two or more different lengths and a space.

51. The method of claim 48, wherein, when the optical recording medium uses an RLL (1, 7) code, the test write pattern comprises a mark of length $2T$ and a mark of length $5T$, and a space.

52. The optical recording and/or reproducing apparatus of claim 48, wherein, when the optical recording medium uses a run-length-limited (RLL) (2, 6) code, the test write pattern comprises a combination of marks of two or more different lengths and a space.

53. The method of claim 48, wherein, when the optical recording medium uses a run-length-limited (RLL) (2, 10) code, the test write pattern comprises a mark of length $3T$ and a mark of length $6T$, and a space.

53. The optical recording and/or reproducing apparatus of claim 47, wherein the system controller determines optimized write, erase, and bias powers necessary for recording when the radio frequency signal for the test write pattern has a maximum amplitude value.

54. The optical recording and/or reproducing apparatus of claim 47, further comprising:

a second detector which detects an asymmetry of the radio frequency signal; and
a third detector which detects a jitter of the radio frequency signal.

55. The optical recording and/or reproducing apparatus of claim 54, wherein the system controller determines an optimized write pattern element indicating a shift amount of a starting edge of a first pulse using the magnitude of the radio frequency signal for the test write pattern.

56. The optical recording and/or reproducing apparatus of claim 54, wherein the system controller determines an optimized write pattern element indicating a period of time for which a cooling pulse lasts using the asymmetry of the radio frequency signal for the test write pattern.

57. The optical recording and/or reproducing apparatus of claim 54, wherein the system controller determines an optimized width of the first pulse using the jitter of the radio frequency signal.

58. The optical recording and/or reproducing apparatus of claim 54, wherein the system controller determines an optimized width of multi-pulses using the jitter of the radio frequency signal.

59. A method of optimizing recording on an optical recording medium using a fast growth method or nucleation dominant method for writing thereon, comprising:
recording a test write pattern in a plurality of tracks of the optical recording medium; and
checking a quality of a radio frequency signal reproduced from one of the plurality of tracks in which the write pattern is recorded and which is effected by writing in adjacent tracks to determine the optimized recording conditions.